MICROBIAL ELECTROSYNTHESIS OF ACETATE FROM CO_2 IS POSSIBLE ON BOTH CARBON AND STEEL CATHODES.

Arends, J.B.A., Boon, N. and Rabaey, K.
Laboratory of Microbial Ecology & Technology, Ghent University, Coupure links 653, B-9000 Gent, Belgium

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Microbial electrosynthesis is an electricity driven process to produce organic compounds from CO_2 and precursor organics using microorganisms as catalysts. The key example is acetate production from CO_2, typically at a carbon cathode using immobilized bacteria on the cathode. However, a key question remaining is whether this attachment of cells is necessary to achieve effective bioproduction. Stainless steel and carbon cathodes were compared at a fixed current density using *Acetobacterium woodii* as a biocatalyst. Acetate production rates of 536 ± 226 mg m^{-2} h^{-1} for a steel cathode and 340 ± 131 mg m^{-2} h^{-1} for a carbon cathode were achieved. Operation at a fixed current density greatly increased production rates per unit projected surface at similar energy investment per gram of product as compared to previously reported studies at set potentials. Whereas further improvements are needed to make this process competitive with existing approaches, these results show that *in situ* hydrogen production with steel has the potential to rapidly transfer electrons to planktonic cells.